Notes.

THE exhibits of the Research Department, Woolwich, at the Imperial War Museum, Crystal Palace, illustrate some of the work vital to the war which was done there, and incidentally our unpreparedness, as much of it might have been done before. Amongst the specimens shown are the six isomers of T.N.T., isolated whilst devising new processes for the manufacture of the symmetrical variety, and for cheaply eliminating the undesirable isomers—a problem not yet fully solved. There are also specimens of amatol, which has largely replaced T.N.T. as a shell-filling; tetranitromethyl aniline, which is of increasing use as an initiator of detonation in others; trinitrobenzene, which should have a future, and many others. The exhibits of fragments of shells detonated by picric acid, T.N.T., and amatol respectively show by the relative numbers of the fragments that picric acid still remains our most shattering shell explosive, and, by the minuteness of most, how limited the killing range of such shells really is. The specimen of R.D.B. cordite illustrates how, when through lack of foresight our supply of acetone failed, our chemists and distilleries saved the situation by providing soluble nitrocellulose and alcohol-ether to gelatinise it. The sections of gaines show how the problem of detonating insensitive shell-fillings was solved during the war by employing a series of explosives in the detonator, and accomplishing in several steps what could not be done with certainty in one. The specimens which display the eroding effect of hot gases on gun-tubes present a problem to chemists which will probably be solved by the invention of a new alloy. An excellent series of X-ray photographs shows that great progress has been made in the penetration of metals. Internal flaws in parts are revealed, and also the internal structure of ammunition—an important matter when captured ammunition has to be examined and dissected. There are many other exhibits of interest.

THE appeal which the chairman of the Brent Valley Bird Sanctuary makes in our correspondence columns for funds with which to buy and endow the reserve which the Selborne Society has maintained for eighteen years will commend itself to most naturalists. It is as important to rear two useful birds as it is to make two ears of corn grow where there was but one before, and the sanctuary has done more than this. Not only has it enabled birds to build undisturbed near London, but its example has been followed elsewhere, and in thousands of gardens have birds been brought up where there were no fledglings previously. This is through the nesting-boxes which the committee has sent out. Such work should go on. A permanent sanctuary within the London area would be an excellent memorial to Gilbert White and crown the efforts of the Selborne Society. Although the gift of the purchase money or some substantial contributions would bring the endeavour to an earlier completion, we imagine that the more subscribers there are the better pleased would the committee be, and small amounts would therefore be welcomed.

THE fifty-seventh annual general meeting of the British Pharmaceutical Conference will be held at Liverpool on July 19–23 under the presidency of Mr. C. A. Hill, managing director of The British Drug Houses, Ltd., who will deliver his presidential address at the Royal Institution, Liverpool, on Tuesday, July 20. The British Pharmaceutical Conference is an organisation established in 1863, and during the fifty-six years of its existence it has made at its annual meetings a total addition of more than a thousand original researches to the common stock of chemical and pharmaceutical knowledge. Among the subjects of the scientific papers to be read at the forthcoming meeting are: A New Method for the Estimation of Cineole in Eucalyptus Oils; The Determination of Hydrocyanic Acid, of Nitrate in Bismuth Carbonate, and of Free Acetic Acid in Acetylsalicylic Acid; Aconite Alkaloids: An Improved Method for their Estimation; and The Detection of Inorganic Phosphate in Glycerophosphates.

WITH the view of obtaining further evidence as to the relationship of the Early Mousterian palæolithic flint implements to the Glacial Chalky Boulder Clay, excavations will be carried out shortly at High Lodge, Mildenhall, Suffolk, by Prof. J. E. Marr, Mr. J. Reid Moir, Mr. Reginald Smith, Mr. Henry Bury, and Mr. M. C. Burkitt. The owner of the High Lodge property, Sir Henry Bunbury, Bart., having given permission for the diggings to be conducted, it is hoped that it may be possible to ascertain with certainty whether the well-known brick-earth of Mousterian age occurring at this spot is younger or older than the Boulder Clay with which it is intimately associated. A full account of the excavations and the conclusions arising therefrom will be published in due course.

THE following elections in connection with the Royal College of Surgeons of England are announced:—*President:* Sir Anthony A. Bowlby. *Hunterian Professors:* Mr. C. W. G. Bryan, Mr. A. G. T. Fisher, Mr. W. S. Handley, Mr. W. G. Howarth, Prof. A. Keith, and Mr. H. Platt. *Arris and Gale Lecturers:* Mr. J. F. Dobson, Dr. F. W. Edridge-Green, and Mr. J. H. Evans. *Erasmus Wilson Lecturer:* Prof. S. G. Shattock. *Arnott Demonstrator:* Prof. A. Keith. *Pathological Curator:* Prof. S. G. Shattock. *Physiological Curator:* Mr. R. H. Burne. *Honorary Curator of the Odontological Collection:* Sir Frank Colyer. Sir D'Arcy Power is to deliver the next Thomas Vicary lecture.

THE VERY REV. DR. W. R. INGE, Dean of St. Paul's, is president for the new session of the Aristotelian Society which will open in November next.

THE Sir Alfred Jones Laboratories of the Liverpool School of Tropical Medicine will be officially opened by Lord Leverhulme on Saturday, July 24, at 2.30. The presentation of Mary Kingsley memorial medals will also be made.

SIR ROBERT JONES has been awarded the Cameron prize of the University of Edinburgh in recognition of his work in orthopædics. Earlier recipients of the prize, which is of the value of about 150*l.*, were Pasteur, Lord Lister, and Sir Lauder Brunton.

DR. SEYMOUR HADWEN has resigned his position as Chief Pathologist in charge of the Biological Laboratory, Health of Animals Branch, Canadian Department of Agriculture, Ottawa, Canada, and become Chief Pathologist in the Reindeer Investigations of the Bureau of Biological Survey, U.S. Department of Agriculture.

WE are informed by the Department of Scientific and Industrial Research that the Research Association for the cutlery industry has been approved by the Department as complying with the conditions laid down in the Government scheme for the encouragement of industrial research. The secretary of the Committee engaged in the establishment of this association is Mr. W. H. Bolton, P.O. Box 49, Sheffield.

THE Royal Statistical Society has opened a register of the names of persons eligible for statistical posts. It has from time to time been asked to recommend qualified statisticians, and has taken this means of bringing those who have appointments to offer into touch with suitable applicants. A list of names and qualifications is now available, and the secretary (9 Adelphi Terrace, W.C.2) will be glad to furnish information accordingly.

WE learn from *Science* that Prof. L. H. Bailey is reorganising the American Pomological Society, of which he is president, and establishing junior branches in a number of agricultural colleges in the United States and Canada. It is proposed under the new scheme that the society shall give consideration to such national affairs as touch the growing of fruits, *e.g.* legislation, quarantine, export, transportation, and standardising methods.

CAPT. W. J. RUTHERFORD has reprinted from "The History of the Berwickshire Naturalists' Club" (vol. xxiv.) a paper on "A Border Myth: The Standing Stones at Duddo." The local folklore accounts for their origin by supposing that the stones are the petrified bodies of a gang of field-workers who profaned the Sabbath by going into a field singing and thinning a crop of turnips, while the leader was thrown on his back and lies prostrate to this day. Capt. Rutherford compares the legend with that attached to the "Maidens" or "Merry Maidens" and the "Hurlers" in Cornwall. The story is not uncommon, and it would not be difficult to quote other parallels.

THE report of the Felsted School Scientific Society for 1918 and 1919 is welcome evidence of the place given to scientific pursuits in an up-to-date school. The natural history notes, which predominate, reach a high standard and contain many interesting observations on the local appearance and movements of migratory birds, while the photographs which have been selected for reproduction say much for the skill and patience of the young naturalists. The report shows how greatly the progress of a school society depends upon the guidance of an enthusiastic master. It is gratifying to see from the balance-sheet that the governors, by a generous contribution to the funds of the society, give evidence of their belief in the value of Nature-study, and their faith is well founded, for the recording of detailed observations, whether of rainfall or temperature or migration, is a sowing of the seeds of the scientific habit and the love of truth.

UNDER the title "The Birds of Eastern Canada," the Canadian Department of Mines has issued a memoir—No. 3 of its Biological Series—by P. A. Tavener. This has been written "to awaken and, where it already exists, to stimulate an interest, both æsthetic and practical, in the study of Canadian birds and to suggest the sentimental, scientific, and economic value of that study; to assist in the identification of native species; and to furnish the economist with a ready means of determining bird friend from bird foe . . .; to present in a readily accessible form reliable data upon which measures of protective legislation may be based; to point out some of the pitfalls that have caught the inexperienced in the past; and to suggest methods for their future avoidance." To accomplish these desirable ends, the memoir treats of all the species with which the ordinary observer is likely to meet "between the Atlantic coast and the Prairies north of the International Boundary." It is prefaced by some general remarks on classification, geographical distribution, migration, and protection, and by an illustrated key to the characters of the groups to which the various species belong. The main portion of the work deals with 766 selected birds, and shortly describes their plumage, haunts, nesting, economic status, and distribution in Eastern Canada: many of them are depicted in the series of coloured plates which forms the concluding portion of this useful memoir.

IN the interests of commerce itself it is becoming increasingly plain that where the exploitation of wild animals is concerned men of science, and not the captains of industry, must determine the levy which any given species can stand without endangering its safety. The urgent need for the speedy recognition of this fact is very emphatically shown in a series of able essays published in the form of a bulletin by the Scripps Institution for Biological Research of the University of California (No. 9). Where all are of such surpassing excellence it is difficult to select any one of these essays for special mention. But since a choice must be made, it shall fall upon that of Dr. Evermann, who surveys the present position of the Northern fur-seal. He throws a lurid light on the attitude of the non-scientific legislator. Even Departments of State, he shows, for the sake of present revenue, will adopt covertly hostile methods to suppress the findings of scientific men appointed for the express purpose of investigating the conditions of the sealing industry, if such findings seem to threaten the earnings of that industry. The fact that, unless wise methods of conservation are adopted, the industry will presently extinguish itself seems entirely to be lost sight of in the desire to secure immediate revenue. "Take the cash in hand and waive the rest" seems to be the motto pursued. Those interested in the salmon fisheries contend that the seals eat vast quantities of these fish, and are therefore injurious to the fishing interests. Yet no attempt has so far been made to discover what fish really constitutes the staple diet of the fur-seal. This aspect of the problem adds to its complexity, since it affects conflicting interests. At the same time it emphasises the need for immediate action, not for academic discussion.

THE many friends of the veteran geologist, Mr. Henry Keeping, who was born near Milton, on the Hampshire coast, in 1827, will welcome his simple and unaffected "Reminiscences," published as a pamphlet by F. W. Talbot, Sussex Street, Cambridge (price 1*s*. 6*d*. post free). A characteristic portrait appears on the cover. Anecdotes of Sedgwick and of the early days of collecting in Devonshire and the Isle of Wight form pleasant reading. The story of the plump farmer in the Fenland who checked a disaster by sitting in the gap of a broken dyke is told with humorous appreciation.

PROF. PIERRE TERMIER, in a paper on "Les Océans à travers les âges" (*Revue Scientifique,* May 8, 1920), emphasises the differences in structure of the Atlantic and Pacific Oceans, and regards the deep-water ring around the central area of the latter as a persistent feature of the crust, liable to disturbances, but not to elevation as dry land. The Indian Ocean, on the other hand, is post-Jurassic and the Atlantic is post-Miocene. The narrowing of the continents southwards is not a primary feature of a tetrahedral earth, but results from the widening of these comparatively modern areas of subsidence as they approach the south.

THE *Geographical Review* (New York) for March, 1920, contains two articles of especial interest to British readers. The first is by Lieut. Leo Walmsley on "The Recent Trans-African Flight," with several photographic illustrations. The writer's wide knowledge of Eastern Africa and his success as a scientific observer even when fighting from his aeroplane fully justify his remark that "Africa, as seen from the air, is one of the most wonderful of all countries. . . . A civilised country seen from the air is simply a gigantic mosaic . . . the airscape of Central Africa is as untamed and irregular as that of the moon." The second article is by Mr. C. R. Dryer on "Mackinder's 'World Island' and its American 'Satellite.'" The author cleverly shows, on Mollweide's projection, the American continents as a "world ring" round about the "world island," and pictures the people of that world ring, which has no barbarous heartland, as ready to come to the aid of the coastal races that stand for civilisation in the world island.

STONYHURST College Observatory has recently issued the results of meteorological and magnetical observations for 1919 with a report and notes by the director, the Rev. A. L. Cortie, S.J. The results with the report occupy 55 pages, and details of the observations are given with great precision for the several months and for the year. The observatory has long since been associated with the Meteorological Office, and the Monthly Weather Report publishes many of the results. The monthly mean temperature is obtained in two ways, from the mean of the highest and lowest daily readings and from the mean of the readings at 9 a.m. and 9 p.m., both means being corrected by Glaisher's tables. The thermometers are mounted 7 ft. above the ground in a Stevenson screen; why in this case should not the height above ground be 4 ft., the normal height for uniformity? Taken as a whole, 1919 was drier and colder than the normal, and every individual month was cold with the exception of May and December. Bright sunshine for the year was 25 hours less than the normal. Rainfall was nearly 6 in. deficient, although the rainy days were only two fewer than usual. October was relatively the driest month, rainfall being only about 50 per cent. of the average. Magnetic observations and disturbances are popularly explained, and afford considerable information for obtaining uniformity of results. Sun-spot activity, which had steadily declined since August, 1917, and throughout 1918, revived in 1919. The seismograph, which for a time had been thrown out of action, is said to be now working satisfactorily.

MR. J. I. GRAHAM, research chemist at the Bentley Collieries, Doncaster, has devised a very convenient and portable apparatus for the estimation of small quantities of carbon monoxide in the air of mines. It consists of a vessel containing a known volume of the sample, which can be introduced by running water out of the vessel. By operating a three-way tap and blowing water into the vessel the sample may be passed into iodine pentoxide contained in a **U**-tube heated to 90°–150° C. In examining air in the mine the temperature is maintained by hot oil contained in a thermos flask which keeps the **U**-tube within these limits for several hours. The iodine liberated from the pentoxide is thus sublimed and driven into a tube containing a solution of potassium iodide in which the free iodine can be titrated and estimated in the usual way. The inventor claims that an analysis can be completed in about five minutes with an accuracy of 0·005 per cent. using 100 c.c. of air, or of 0·0005 per cent. with 1 litre. It is of special value for estimating small quantities of carbon monoxide in mine-air, since 0·2 per cent. is highly dangerous, and even 0·02 per cent. produces after a time unpleasant effects. As the quality of compressed oxygen supplied in cylinders is important in life-saving operations in mines, Mr. Graham has introduced a simple piece of apparatus for determining the amount of oxygen by absorbing a known volume in alkaline pyrogallol. Both pieces of apparatus can be purchased from Messrs. Reynolds and Branson, Ltd., Leeds.

IN order to obviate the use of the high voltages required in wireless telegraphy when a triode tube is operated from a direct-current supply by means of a mechanical "chopper" which periodically breaks the supply circuit, Mr. L. M. Hull, of the Bureau of Standards at Washington, has used with great success an alternating supply from a 2-kw. machine giving 500 cycles per second at 150 volts, and a short account of his method and results is given in the Journal of the Washington Academy of Sciences for June 4. The sending key is in the alternator circuit, and the filament current and plate potential are both provided by means of transformers. The author finds that, operated in this way, the triode tube gives results which compare favourably with those obtained with the usual direct-current method, and that it has the advantage of not requiring a high-voltage generator or battery, while over a limited distance signals may be received with a non-oscillating detector. A more complete account of this work is to appear as a Scientific Paper of the Bureau.

Mr. S. J. Peachey, lecturer in chemistry at the College of Technology, Manchester, claims to have discovered a process for the cold vulcanisation of rubber. This is applicable not only to rubber in its solid forms, but also to solutions. The final product may be obtained containing no free sulphur. Leather waste, wood-meal, and starch cellulose may be mixed with rubber so as to yield cheap, fully vulcanised products with new properties and great durability. Leather waste and rubber may be converted into a product resembling leather, and at the same time waterproof. No details of the process are given beyond the fact that it employs "two gases which are by-products of several chemical manufacturing processes, and are available at a very low cost." If these claims can be substantiated, it appears that the process should be one of very great technical interest and importance.

Facility of manipulation and precision in adjustment are two prime features in X-ray tube stands. They appear to have been carefully considered in the models Mark III. and Mark IV. which we find in Bulletin 255 of Messrs. Watson and Sons, Ltd. In the screen attachment to the latter model there is an arrangement whereby the X-ray tube and the screen move together during vertical examinations. We would suggest that a valuable addition to the illustrations of these models would be the protective devices to be employed with them. It is especially necessary during screening examinations to avoid stray radiation reaching the operator, and the adoption of rigorous protective measures would no doubt become more general if publicity were given to this requirement.

In the course of an article on Pelton-wheel construction by Mr. Percy Pitman, in *Engineering* for June 25, the author describes the method adopted for improving the jets, which were unsatisfactory in the existing turbine. Experimental nozzles were made in fluid-pressed bronze, and four rustless steel blades, 5 mm. thick, were dovetailed into them so as to lie in axial planes. These blades were ground and highly polished up to a thin knife-edge. A great improvement resulted; the jets were of extraordinary solidity and transparency, the water for about 2 ft. issuing almost like a glass rod. Those interested in the design of Pelton-wheel buckets will find a good deal of useful information in this article; there is but little of practical value in text-books, and the author gives the complete lay-out of the new buckets, and includes copies of the working drawings.

Our Astronomical Column.

An Easy Method of Finding Latitude.—The *Observatory* for June contains an article by N. Liapin on a method of finding latitude which is interesting and a useful exercise for astronomical students, and requires no other instrument than a watch. The method consists simply in observing the number of seconds between first and last contacts of the sun with the horizon at sunrise or sunset. The formula for solution given by the author is $\cos^2$ latitude $=$ $\sin^2$ (sun's decl.) $+ 4$ (sun's radius)^2/(time interval)^2, where the radius and time interval must be expressed in the same units. This formula does not take account of the change of sun's decl. in the interval; a correction for this may readily be made.

Five actual determinations by this method are given, the resulting latitude being 10′ from the truth. While a sea horizon is preferable, any straight and level horizon will serve.

Increasing the Photographic Power of Telescopes.—In the Proceedings of the U.S. National Academy of Sciences for March Dr. Shapley describes a method of increasing the photographic power of large reflectors for the purpose of photographing extremely faint objects. The faintest stars at present reached by the 60-in. reflector are of magnitudes 20 to 21, and it is believed that the great Hooker telescope will gain about one magnitude over this. Dr. Shapley is of the opinion that this is bordering on the limiting magnitudes in globular clusters, and if one or two fainter magnitudes were available for study, some most important information might be obtained with regard to several questions of stellar and galactic evolution. The method employed is quite simple, consisting essentially in shortening the effective focal length of the telescope by means of a short focus lens placed between the mirror and the plate. The brightness of the image is thus increased, though, of course, a reduction of scale is inevitable. This, however, is immaterial in many sidereal problems. A trial series of exposures with different intensifiers seems to have yielded satisfactory results, and questions relating to globular clusters, the limits of the galactic system, and similar problems appear to be more hopeful of solution.

A New Spectropyrheliometer and Solar Measurements made with it.—In No. 378 of the Scientific Papers of the U.S. Bureau of Standards, recently issued, Messrs. W. W. Coblentz and H. Kahler give an account of a new spectropyrheliometer and measurements of the component radiations from the sun and from a quartz-mercury vapour lamp. The spectropyrheliometer consists of a quartz spectrograph and cylindrical condensing lens placed upon an equatorial mounting, thus eliminating the ultra-violet absorption produced in heliostat mirrors. The paper sums up the data given on the relative components of infra-red, visible, and ultra-violet radiation from the sun and from a quartz-mercury arc lamp, also on the gas-filled tungsten lamp, the iron arc, and the carbon arc. In the first appendix methods are given for excluding ultra-violet light from buildings, one of these being the use of a kind of Venetian blind or louvre of wide slats, painted buff to reflect the light into the building, the buff or red paint absorbing the ultra-violet, thus protecting the contents of the building (balloon hangars, etc.) from photochemical action. The second appendix suggests methods for protecting projection lantern films from the heat of the lamp, and a simple method put forward is to provide the water-cell with windows of Corning "heat-absorbing" glass, which is very opaque to infra-red radiation.